

***Infrared Observations of Comets***

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Selected comets are observed in the near-infrared (1-2.2  $\mu\text{m}$ ) and thermal infrared (3.5-20  $\mu\text{m}$ ) with the NASA Infrared Telescope Facility (IRTF) and other telescopes as appropriate, in order to characterize the physical properties of the dust grains -- their composition, size distribution, emissivity, and albedo. Systematic variations in these properties among comets are looked for, in order to understand the heterogeneity of comet nuclei. Spectrophotometry of the 10  $\mu\text{m}$  silicate emission feature is particularly emphasized. The rate of dust production from the nucleus and its temporal variability are also determined. Knowledge of the dust environment is essential to S/C design and mission planning for NASA's CRAF mission.

***Progress and Accomplishments***

10  $\mu\text{m}$  spectrophotometry of Comet Levy was obtained at the IRTF; a strong silicate feature was detected with an 11.3  $\mu\text{m}$  olivine peak similar to that in Comets Halley and Bradfield (1987). This result is significant in showing that crystalline olivine grains are prevalent in both new and evolved comets. A paper on Comet P/Brorsen-Metcalf has been submitted for publication. Although its orbit is similar to that of P/Halley, the dust properties are very different; no silicate feature was present. We interpreted the observations with a model of large grains in the coma. A paper on the dust coma of P/Giacobini-Zinner has been submitted for publication.

***Projected Accomplishments***

IRTF time has been obtained for extending the spectrophotometry of the 10  $\mu\text{m}$  region to the fainter, short-lived comets with favorable geometry, as well as continuing to observe bright comets as targets of opportunity. Papers on Comet Austin and Comet Levy are in progress. The observed shape of the silicate feature in Comets Halley and Levy is being compared with models for the emission from inhomogeneous, irregular particles.

***Publications***

Hanner, M. S., Newburn, R. L., Gehrz, R. D., Harrison, T., Ney, E.P., and Hayward, T. L. (1990). The infrared spectrum of Comet Bradfield (1987s) and the silicate emission feature. *Astrophys. J.* **348**, 312.

Hanner, M. S., and Tokunaga, A. T. (1990). Infrared techniques for comet observations. In *Comets in the Post-Halley Era*, ed. R. L. Newburn, M. M. Neugebauer, and J. Rahe, in press.